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General Notes.

GEOLOGY AND PALEONTOLOGY.

Paleozoic Formations of Southern Minnesota.—A systematic account of the Paleozoic formations of southeastern Minnesota, by C. W. Hall and F. W. Sardeson, is given in the Bulletin of the Geological Society of America for 1892. The rocks described occupy an area some 13,200 square miles in extent. They stretch eastward from a straight line between Mankato and Hinckley to the State of Wisconsin, and from Chengwatona southward to Iowa. These periods of geologic time are represented by three formations: Upper Cambrian, Ordovician, and Devonian. These Paleozoic rocks are underlain by the Archean and Algonkian, and lie beneath patches of Cretaceous and a covering of quaternary débris save in the extreme southeastern corner included in Chamberlin's "driftless area."

The Upper Cambrian is represented in this region by the Potsdam sandstone and the Magnesian series; the Ordovician by the St. Peter, the Trenton, and the Cincinnati beds. The Devonian is present in so thin a layer in which so few fossils occur that it cannot be assigned to any division of that group, but is supposed to belong near the middle.

The writers give the following summary of thickness and leading lithological characters based chiefly upon their own measurements and determinations:

					FEET.
Devonian.	Not subdivided.		Limestone and shale		10–15
Ordovician	Cincinnati.	Wykoff.	Limestone	20	70
		Maquoketa.	Shale and limestone	20	
	Trenton	Galena.	Maclurea limestone	50	120
			Lingulasina limestone	20	
			Camarella shaly limestone	30	
			Orthisina calcareous shale	20	
		Trenton.	Zygospira shale	8	95
			Fucoid shale	20	
			Stictopora shale	30	
			Stictoporella limestone and shale	10	
			Blue limestone	12	
			Buff limestone	15	
	Saint Peter, not subdivided, sandstone				75–164
			Upper Shakopie dolomite		10–65
			Elevator B (Richmond) sandstone		20
Upper Cambrian.	Magnesian,		Lower Shakopie dolomite		75–175
			Jordan sandstone		75–200
			Saint Lawrence, dolomites and shales		30–213
	Potsdam, not subdivided, sandstones and shales				0–1,300
	Total thickness of Paleozoic strata in Minnesota.............				560–2,437

The Genus Hybodus.—According to Mr. A. S. Woodward, the genus Hybodus, which was determined solely from the evidence of the teeth and associated ribbed dorsal fin-spines, is now definitely determined by the other essential regions revealed by new specimens. The fossils in question comprise numerous skulls and two portions of the trunk of the typical *Hybodus basanus* from the Wealden of the Sussex coast.

The characters which afford information are (1) the presence of hooked cephalic spines, and (2) the occurrence of a vacant space between the neural and hæmal arches of the endoskeleton, which must have been occupied by a persistent notochord. Mr. Woodward is inclined to think that the presence or absence of cephalic spines will eventually prove to be a sexual character.—Proceeds. Yorkshire Geol. and Polytechnic Soc., Vol. xii, 1891.

On Some Dicynodont and Other Reptilian Remains from the Elgin Sandstone.—At the Aberdeen meeting of British Association in 1835, Dr. Traquair called attention to the skull of a *Dicynodont* which had been discovered in the Elgin sandstone of Cutlies Hillock (= New Spynie). Since that time several other specimens have been obtained from the same place, some of which are the property of the Elgin Museum, while others belong to the Geological Survey of the United Kingdom. These specimens are now being worked out by Mr. E. T. Newton, and the following is a preliminary note on the interesting results which have been obtained.

All the reptile remains obtained from Cutlies' Hillock are in the condition of hollow casts, the bones themselves having been dissolved away; this, it will be remembered, was the case with some of the examples of *Stagonolepis* from the Elgin sandstone, described by Prof. Huxley, and the method of taking casts from the hollow cavities which was adopted in that case, has been found of great advantage in the present instance. The blocks when brought from the quarry were more or less split open, exposing portions of the specimens. In some cases these cavities were traced out and developed with the chisel, while in others they were further split open, thus allowing casts to be taken. In many cases these casts had to be made in several parts and afterwards fitted together. The time and labor involved in this task have been repaid by the restoration of the skulls and parts of skeletons of several *Dicynodonts*, and one or two other equally remarkable forms of reptiles.

In most of these specimens, including that noticed by Dr. Traquair, the skulls are similar in form, although differing in minor details, and have a general resemblance to the South African *Dicynodon* and *Oudenodon*, some of them having small tusks in the maxillary bones. With most of these skulls parts of the skeleton have been found. Two or three show the position of the vertebral column and ribs, but up to the present no definite centra have been traced; besides this there is evidence of scapula, clavicle, humerus, radius, and ulna, the humerus having the characteristic anomodont expansion of the two extremities. In two specimens the ilia are preserved. These forms appear to be distinct from *Dicynodon*, and probably represent at least two or three species.

Another skull presents most of the characters of *Lystrosaurus*, but has a short muzzle and no teeth. The last, and by far the most remarkable skull of this series, is about six inches in length, and has the outer surface completely covered in by bony plates, the nostrils, eyes, and pineal fossa being the only apertures. The chief feature of this skull is the extreme development of horns upon the face and cheeks, there being about thirty of these formidable defences varying from about a fourth of an inch to nearly three inches in length, besides some smaller bones. The dentition is pleurodont, and resembles very closely that of the living Iguana; the palate is lacertilian, but with the pterygoids united in front of the pterygoid vacuity. This skull reminds one very strongly of the living *Moloch* and *Phrynosoma*, but it probably finds its nearest ally in the *Pareiasaurus* from the South African Karoo bed. The detailed description of these specimens is nearly completed and will, it is hoped, be shortly published.—Geol. Mag., Nov., 1892.

Cenozoic Insects.—In discussing the Rhynchophora of North America, Mr. S. H. Scudder refers to the variety and abundance of insect life during the early Cenozoic period as follows:

"In the earlier Tertiaries we not only possess in profusion representatives of every one of the orders of insects, but every dominating family type which exists to-day has been recognized in the rocks; even many of the families which have but a meager representation to-day have also been discovered, and though many extinct genera have been recognized, no higher groups, with a single exception or two, have been founded upon extinct forms. This is one of the most striking facts which confronts the student of fossil insects. It is the more striking from the delicacy, the tenuity, and miniatures of many of the forms which are here concerned; and the statement can be enforced by the further fact that the parasitic groups—those which are entomophagous—are represented, as well as many of those which in the present time show peculiar modes of life; thus we have representatives of such microscopie parasitic insects as Myrmar, strepsipterons have been discovered, the viviparity of the ancient Aphides has been shown probable, the special sexual forms of ants and white ants were as clearly marked as to-day, and the triungulin larva of Meloe has been found enclosed in amber, showing that the phenomenon of hypermetamorphism had already been developed.—Proceeds. Boston Soc. Nat. Hist., Jan., 1892.

Uplifts in the Sierras of California.—A paper of Mills in the Bull. G. S. A., Vol. 3, contains the following account of the orographic movements from which result northern half of the Sierra Nevada range.

Along the axes of the greatest uplifting of the present range a pre-Mesozoic range arose carrying up both crystalline and metamorphosed sedimentary rocks, which partially disappeared through erosion and subsidence; then a mesozoic range arose and its strata became uptilted, and it in turn was reduced by erosion and subsidence to very small proportions, and then in Tertiary and Quaternary time has arisen the present range, which is now undergoing its erosion."

A New Pliocene Ruminant.—The right mandible of a large animal found in the lowest Pliocene formation in the vicinity of Oran has been referred to the order of Artiodactyla by M. Pomel under the name *Libytherium maurusium.* In dimensions it rivals Helladotherium, with which it has some affinities, but from which it differs unmistakably. The fossil measures 30 centimetres from the posterior border of the last molar to the posterior part of symphysis.—Revue Scientifique, July, 1892.

A Remarkable Artiodactyle from the White River Epoch.—In a late number of the Bulletin of the American Museum of Natural History, Drs. Osborn and Wortman describe a species of Artiodactyle which differs much from any form previously known. A considerable part of the skeleton was obtained, together with crania of both male and female. The superior premolars (except the last) are simple, thus excluding the genus from the Boöidea, and the cuboid and navicular bones are distinct, a character which separates it from the Tragulidæ. The cervical vertebræ are undescribed, but the characters in general refer it to the Oreodontidæ rather than to any group of the camel series. The metapodial bones are distinct, and there are four in front and two posteriorly. Both sexes have a pair of low horn-cores or tuberosities on the parietal bones, but the male has other tuberosities and processes as follows: The superciliary borders are produced posteriorly into a prominent lobe, and a low tuberosity rises from the frontal at its anterior border, just in front of the orbit. Each maxillary develops an anteriorly projecting process above the last premolar tooth, and then rises into a huge elevated compressed plate with thickened apex at the side of the narrow nasal fissure. The latter opens far posteriorly, as the nasal bones are very short and wide. The molar teeth are Oreodontoid, and the superior canines are worn posteriorly, showing that there was a large inferior first premolar as in Oreodon. The canine has also the triangular section seen in that family. The inferior canine is recumbent, and resembles an incisor. No superior incisors.

The absence of superior incisors is a character which is uncommon in the Oreodontidæ, but is found in the genus Merycopater, and probably in Pithecistes. The discovery of a horned member of the group is interesting. The female of the species was first described by Marsh under the name of *Protoceras celer*. It is probable, however, that it is nearly allied to, if not actually pertaining to the genus Stibarus Cope, described in 1873. The latter was founded on a fragment of lower jaw with premolar teeth, a part which has not been found in the species described by Drs. Osborn and Wortman. The latter was found by Dr. Wortman in the upper White River beds; the *Stibarus obtusilobus* is a smaller species, and comes from the lower beds of the same series. I give figures of parts of the skeleton from clichés kindly furnished by Dr. Osborn (Plates I and II).—E. D. Cope.

The White Clays of the Ohio Region.—In southeastern Indiana and southwestern Ohio occur a series of clays overlying the glacial beds and differing from them in color and structure. There are similar clay deposits in southern Ohio outside the glacial boundary. Mr. Frank Leverett, in a paper published in the Amer. Geol., July, 1892, cites evidence to show that these deposits are synchronous, that they have a common origin, that that origin is independent of both ice-dams and organic agencies, but is best explained by a fluvio-lacustrine hypothesis. Furthermore, they furnish important evidence concerning the sequence of events in this region during the glacial period.

Geological News, General.—Mr. R. S. Tarr has published a paper in the Am. Geol., July, 1892, calling attention to the relation of secular decay of rocks to the formation of sediments. The essay is in the main a summary of the present knowledge of secular disintegration.——The rocks of the Guadalupe Mountains are referred by R. S. Tarr to the Upper Coal Measures instead of the Permian as determined by Shumard. Bull. No. 3, Geol. Surv. Texas.——A Geological and Agricultural Survey of the State of Louisiana has been undertaken in the interest of agriculture, the first publication of which has just been issued. It consists of a preliminary report on the northern part of the State, by Dr. Otto Lerch, covering the Topography, General Geology, Water Supply, Distribution of Soils and Useful Minerals.——M. Adolph Carnot states that the relative age of fossil bones can be ascertained by estimating the amount of fluoride of calcium entering into their percentage composition. His method was applied recently to determine whether a human tibia was contemporaneous with the bones of animals with which it was associated. The chemical analysis proved that the tibia contained only the same percentage of fluoride as a recent human bone, while the associated animal remains yielded seven to nine times as much fluoride as their recent analogues. Hence the tibia in question belongs to a later period than the other fossils with which it was found, a result in which M. Rivière acquiesces on other grounds.—Comptes-Rendus, Vol. cxv, pp. 337–339.

Archean.—Dr. Charles Barrois announces the discovery of Radiolaria in the Archean rocks of Brittany. The fossils occur in a fine siliceous matrix (phtanite) associated with fragments of graphite, in the neighborhood of Lamballe, Côtes-du-Nord. M. Cayeux, to whom the fossils were submitted, regards them as simple Radiolaria, of the family Monosphæridæ.—Natural Science, Oct., 1892.

Paleozoic.—According to Dr. Rüst, Radiolarian fossils are abundant in Paleozoic rocks, and nearly all of the Paleozoic Radiolaria can be referred to the genera recognized by Haeckel in the seas of to-day. —Palæontographica, Vol. xxxviii, pp. 107–200.

Three new species of fish—*Protodus jexii, Diplodus problematicus,* and *Acanthodes semistriatus*—have been added to the list of Lower Devonian Fish-fauna by Mr. A. S. Woodward. The fossils were collected by Mr. Jex at Campbellton, New Brunswick, and are now in the British Museum.—Geol. Mag., Jan., 1892.

Mr. J. C. White reports a small collection of fossil plants from the Wichita beds of Texas. They are essentially the same with the flora from southwestern Pennsylvania described by Prof. Fontaine. This makes an equivalency probable between the uppermost beds of the Carboniferous system in West Virginia, southwestern Pennsylvania and southern Ohio (the Dunkard Creek series), and those of the Wichita beds of Texas—Bull. Geol. Soc. Am., Vol. iii.

Mesozoic.—A Termite, discovered in the English Lias by Mr. Montagu Brown, exhibits even the patches of pigment on the wings. It is described by Dr. Henry Woodward in the May number of the Geol. Mag. under the name *Palæotermes ellisii.*——Mr. A. S. Woodward reports *Pholidophorus germanicus* from the Upper Lias of Whitby, Yorkshire. This Lepidosteoid fish was observed by Quensted in the Lias of Würtemburg and named in 1858.—Geol. Mag., Dec., 1891.——A mammalian tooth discovered by Mr. Charles Dawson has been given the provisional name *Plagiaulax dawsonii* by Mr. A. S. Woodward, who describes and figures it in the Proceeds. London Zool. Soc., Nov., 1891. This fossil is the first evidence of a European Cretaceous mammal.——A fine specimen of Belonostomus from the Rolling Downs formation (Cretaceous) of Central Queensland is described and figured by Mr. Etheridge in the Trans. Roy. Soc. Victoria, 1891, under the name *Belonostomus sweetii.* The specimen is supplemented by four other fragments so that all the more important features in the skeleton of the fish are made known.

Cenozoic.—A proof of the identity of the diatomaceous beds of New Jersey, Delaware and the outcrops on the western shore of Chesapeake Bay is afforded by the presence of a single specific form of diatom, Heliopelta, which occurs at the base only of this bed, and has not been found elsewhere in the world, either fossil or recent.—Ann. Rep. State Geol. New Jersey, 1891.——Mr. Harlé reports the finding of the right mandible of a monkey in a cave in the stone quarry of Montsaunés. The fossil in question is that of a Macaque and as it appears to Mr. Harlé to be a distinct species, he has given the name *Macacus tolosanus.*—Comptes-rendus, fev. 1892.——A list of Birds from the so-called Post-Pliocene drifts of Queensland, by Mr. De Vis, is an interesting contribution to avian literature. The list comprises twenty-eight species referred to twenty-four genera. The whole of the twenty-eight species and seven or perhaps eight of the genera are extinct. This change is very much the same as that observed in the case of the marsupials.—Proceeds Linn. Soc. N. S. W., Vol. vi.